Measurement

Measurement is an important tool in the geometry toolkit. We know little about objects if we cannot measure them.

Measurement can be physical, such as direct observation with a ruler or laser or it can be calculated, like when you determine the angle of a triangle using sine or cosine.

The measurements of an object tell us many important things like size, area, volume, etc. In addition, we can tell whether objects are "similar" by noting whether their all of their measurements have the same scale/ratio.

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Physical Measurement

We have many ways to physically measure an object. For example, we can use a ruler to measure a notebook, a yardstick to measure a sports field and miles to measure the distance between cities.

An important consideration when measuring is choosing the right measuring tool/units. For example, we would not use a ruler to measure the distance between two cities. It is simply not practical. Similarly, we would not use miles to measure the dimensions of a room.

Another consideration is precision. This is the degree of accuracy we have when we measure something.

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Example

Suppose we had to measure the dimensions of a room to determine how much paint we need.

A proper measuring tool would include a tape measurer, a laser measurer and (in a pinch) a yard or meter stick. For painting, our degree of precision need not be great: we want to be accurate to the square foot or square yard.

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Example

On the other hand, if we wanted to measure the diameter of a blood vessel there isn't an everyday tool we could use to measure it. We would need a specialized medical device and it would need to have great precision, as blood vessels are tiny and their walls very thin and our measurement needs to be very accurate if we are to use the data to diagnose and treat people.

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Example

Sometimes the object we wish to measure is theoretical. That is, we either cannot see it or it doesn't exist physically.

This is when a calculated measurement is useful. Let's say we know a distant object in our solar system exists but we can't see it. We can measure the gravitational disturbances it creates to determine things like size, mass and orbit.

Another example is the work you do in class. We often deal with theoretical objects that don't exist physically, such as "triangle ABC" but we can deduce measurements using data and calculations.

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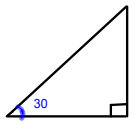
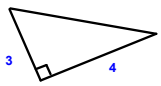
Example



For this triangle we know two of the angles, so we can calculate the third angle because we know that all the angles must sum to 180 degrees.



For this triangle we can compute the length of the hypotenuse because we know that for right triangles, the sum of the squares of the lengths of the sides is equal to the square of the hypotenuse. ($x^2 + y^2 = z^2$)

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In-class task!

Today in class your task is to measure TEN things you have with you or that are in the classroom.

You may move about the room to do this but YOU MUST WORK QUIETLY. This is not an excuse to talk loudly or disrupt the other classrooms.

Write down what you measured, what the measurement is and why you used the measuring tool that you did.

Can you think of another measuring tool that may have done a better job? Were you limited in what you could measure by what tools you had at hand?

When you are done turn in your paper to the tray up front. (5 points)

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